CLAIMS

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What is claimed is:



A method for marking one or more packets of data in a packet-switched network based on achieved flow bandwidth information within the network, comprising the computer-implemented steps of:

marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment;

determining an achieved flow bandwidth for the data flow based on data traffic within the network;

determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and

marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second group of one or more

2. The method as recited in Claim 1, wherein:

the step of marking a first group of one or more packets includes the step of storing a first differentiated services codepoint (DSCP) value in each header of the first group of one or more packets of a data flow;

packets with a second quality of service treatment.

the step of determining a second behavioral treatment value includes the step of determining a second DSCP value; and

the step of marking a second group of one or more packets includes the step of storing the second DSCP value in each header of the second group of one or more packets of a data flow.

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1	3.	The method as recited in Claim 1, further comprising the steps of:
2		determining packet flow characteristics of the first group of one or more packets
3		of a data flow; and
4		determining the second behavioral treatment value based on the available
5		bandwidth within the network and the packet flow characteristics of the
6		first group of one or more packets of a data flow.
1	4.	The method as recited in Claim 1, further comprising the steps of:
2		establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
3		treatment for forwarding packets within a flow in said network; and
4		generating the first behavioral treatment value based on the established QoS
5		policy.
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1	5.	A computer-readable medium carrying one or more sequences of instructions for
2		marking one or more packets of data in a packet-switched network based on
3		achieved flow bandwidth information within the network, wherein execution of
4		the one or more sequences of instructions by one or more processors causes the
5		one or more processors to perform the steps of:
6		marking a first group of one or more packets of a data flow with a first behavioral
7		treatment value, wherein the first behavioral treatment value directs
8		devices within the network to treat the first group of one or more packets
9		with a first quality of service treatment;
10		determining an achieved flow bandwidth for the data flow based on data traffic
11		within the network;
12		determining a second behavioral treatment value based on the achieved flow
13		bandwidth within the network; and
14		marking a second group of one or more packets of said data flow with said second
15		behavioral treatment value, wherein the second behavioral treatment value

16		directs devices within the network to treat the second group of one or more
17		packets with a second quality of service treatment.
1	6.	The computer-readable medium as recited in Claim 5, wherein:
2		the step of marking a first group of one or more packets includes the step of
3		storing a first differentiated services codepoint (DSCP) value in each
4		header of the first group of one or more packets of a data flow;
5		the step of determining a second behavioral treatment value includes the step of
6		determining a second DSCP value; and
7		the step of marking a second group of one or more packets includes the step of
8		storing the second DSCP value in each header of the second group of one
9		or more packets of a data flow.
1	7.	The computer-readable medium as recited in Claim 5, further comprising
2		instructions for performing the steps of:
3		determining packet flow characteristics of the first group of one or more packets
4		of a data flow; and
5		determining the second behavioral treatment value based on the available
6		bandwidth within the network and the packet flow characteristics of the
7		first group of one or more packets of a data flow.
1	8.	The computer-readable medium as recited in Claim 5, further comprising
2		instructions for performing the steps of:
3		establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
4		treatment for forwarding packets within a flow in said network; and
5		generating the first behavioral treatment value based on the established QoS
6		policy.

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1	9.	A computer apparatus comprising:
2		a processor; and
3		a memory coupled to the processor, the memory containing one or more sequences
4		of instructions for marking one or more packets of data in a packet-
5		switched retwork based on achieved flow bandwidth information within
6		the network, wherein execution of the one or more sequences of
7		instructions by the processor causes the processor to perform the steps of:
8		marking a first group of one or more packets of a data flow with a first
9		behavioral treatment value, wherein the first behavioral treatment
10		value directs devices within the network to treat the first group of one
11		or more packets with a first quality of service treatment;
12		determining an achieved flow bandwidth for the data flow based on data
13		traffic within the network;
14		determining a second behavioral treatment value based on the achieved
15		flow bandwidth within the network; and
16		marking a second group of one or more packets of said data flow with said
17		second behavioral treatment value, wherein the second behavioral
18		reatment value directs devices within the network to treat the second
19		group of one or more packets with a second quality of service
20		treatment.
1	10.	The computer apparatus as recited in Claim 9, wherein:
2		the step of marking a first group of one or more packets includes the step of
3		storing a first differentiated services codepoint (DSCP) value in each
4		header of the first group of one or more packets of a data flow;
5		the step of determining a second behavioral treatment value includes the step of
6		determining a second DSCP value; and
7		the step of marking a second group of one or more packets includes the step of
8		storing the second DSCP value in each header of the second group of one
9		or more packets of a data flow.

performing the steps of: determining packet flow characteristics of the first group of one or more packet of a data flow; and determining the second behavioral treatment value based on the available bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow. 12. The computer appearatus as recited in Claim 9, further comprising instructions performing the steps of: establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 13. A network device configured for marking one or more packets of data in a packets witched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achiem flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value, wherein the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second			1
determining packet flow characteristics of the first group of one or more packet of a data flow; and determining the second behavioral treatment value based on the available bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow. 12. The computer apparatus as recited in Claim 9, further comprising instructions performing the steps of: 13. establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 13. A network device configured for marking one or more packets of data in a packet switched network based on achieved flow bandwidth information within the network, comprising: 14. means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs evices within the network to treat the first group of one or more packets with a first quality of service treatment; 15. means for determining an achieved flow bandwidth for the data flow based on traffic within the network; 16. means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow within the network; and means for marking a second group of one or more packets of said data flow within the network; and means for marking a second group of one or more packets of said data flow within the network and means for marking a second group of one or more packets of said data flow within the network data flow within the network to treat the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value directs devices within the network to	1	11.	The computer apparatus as recited in Claim 9, further comprising instructions for
of a data flow; and determining the second behavioral treatment value based on the available bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow. 12. The computer apparatus as recited in Claim 9, further comprising instructions apperforming the steps of: establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 13. A network device configured for marking one or more packets of data in a packets witched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with a first quality of service treatment value based on the achier flow bandwidth within the network; and means for marking a second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	2		performing the steps of:
determining the second behavioral treatment value based on the available bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow. 12. The computer apparatus as recited in Claim 9, further comprising instructions are performing the steps of: establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 13. A network device configured for marking one or more packets of data in a packet switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first group of one or more packets of a data flow with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with a flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with a flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with a flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with a flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow within treatment value directs devices within the network to treat the second behavioral treatment value, wherein the second behavioral treatment	3		determining packet flow characteristics of the first group of one or more packets
bandwidth within the network and the packet flow characteristics of the first group of one or more packets of a data flow. 1 12. The computer apparatus as recited in Claim 9, further comprising instructions performing the steps of: establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 1 13. A network device configured for marking one or more packets of data in a packet switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieval flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value, wherein the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value directs devices within the network to treat the second	4		of a data flow; and
first group of one or more packets of a data flow. The computer apparatus as recited in Claim 9, further comprising instructions performing the steps of: establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. A network device configured for marking one or more packets of data in a pact switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieval flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value directs devices within the network to treat the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	5		determining the second behavioral treatment value based on the available
1 12. The computer apparatus as recited in Claim 9, further comprising instructions performing the steps of: 2 establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 1 13. A network device configured for marking one or more packets of data in a pack switched network based on achieved flow bandwidth information within the network, comprising: 4 means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; 8 means for determining an achieved flow bandwidth for the data flow based on traffic within the network; 10 means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and 11 means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	6		bandwidth within the network and the packet flow characteristics of the
performing the steps of: establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. A network device configured for marking one or more packets of data in a pack switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	7		first group of one or more packets of a data flow.
performing the steps of: establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. A network device configured for marking one or more packets of data in a pack switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	1	12	The computer apparatus as resited in Claim 0, further comprising instructions for
establishing a Quality of Service (QoS) policy for applying a per-hop-behavior treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 1 13. A network device configured for marking one or more packets of data in a packets withen network based on achieved flow bandwidth information within the network, comprising: 4 means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; 8 means for determining an achieved flow bandwidth for the data flow based on traffic within the network; 10 means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and 11 means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second		12.	· · · · · · · · · · · · · · · · · · ·
treatment for forwarding packets within a flow in said network; and generating the first behavioral treatment value based on the established QoS policy. 1 13. A network device configured for marking one or more packets of data in a packets witched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achievalue bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second			
generating the first behavioral treatment value based on the established QoS policy. 1 13. A network device configured for marking one or more packets of data in a pace switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second			
1 13. A network device configured for marking one or more packets of data in a packet switched network based on achieved flow bandwidth information within the network, comprising: 4 means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; 8 means for determining an achieved flow bandwidth for the data flow based on traffic within the network; 10 means for determining a second behavioral treatment value based on the achieval flow bandwidth within the network; and 11 means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second			
switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; means for marking a second group of one or more packets of said data flow within the network; and means for marking a second group of one or more packets of said data flow within the network to treat the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	5		
switched network based on achieved flow bandwidth information within the network, comprising: means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	6		policy.
network, comprising: means for marking a first group of one or more packets of a data flow with a fi behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or mor packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow wi said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	1	13.	A network device configured for marking one or more packets of data in a packet-
means for marking a first group of one or more packets of a data flow with a first behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or more packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow within the network of the second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	2		switched network based on achieved flow bandwidth information within the
behavioral treatment value, wherein the first behavioral treatment value directs devices within the network to treat the first group of one or mor packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achieved flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	3		network, comprising:
directs devices within the network to treat the first group of one or mor packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achievable flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	4		means for marking a first group of one or more packets of a data flow with a first
packets with a first quality of service treatment; means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow wi said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	5		behavioral treatment value, wherein the first behavioral treatment value
means for determining an achieved flow bandwidth for the data flow based on traffic within the network; means for determining a second behavioral treatment value based on the achievalue bandwidth within the network; and means for marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	6		directs devices within the network to treat the first group of one or more
traffic within the network; means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow wi said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	7		packets with a first quality of service treatment;
means for determining a second behavioral treatment value based on the achier flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow wi said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	8		means for determining an achieved flow bandwidth for the data flow based on data
flow bandwidth within the network; and means for marking a second group of one or more packets of said data flow wi said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	9		traffic within the network;
means for marking a second group of one or more packets of said data flow wi said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	10		means for determining a second behavioral treatment value based on the achieved
said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second	11		flow bandwidth within the network; and
treatment value directs devices within the network to treat the second	12		means for marking a second group of one or more packets of said data flow with
	13		said second behavioral treatment value, wherein the second behavioral
group of one or more packets with a second quality of service treatmen	14		treatment value directs devices within the network to treat the second
\1	15		group of one or more packets with a second quality of service treatment.

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A method for marking one or more packets of data in a packet-switched network			
based on achieved flow bandwidth information within the network, comprising the			
computer-implemented steps of:			
causing one or more network devices to mark a first group of one or more packets			
of a data flow with a first behavioral treatment value, wherein the first			
behavioral treatment value directs devices within the network to treat the			
first group of one or more packets with a first quality of service treatment;			
determining an achieved flow bandwidth for the data flow based on data traffic			
within the network;			
determining a second behavioral treatment value based on the achieved flow			
bandwidth within the network; and			
causing one or more network devices to mark a second group of one or more			
packets of said data flow with said second behavioral treatment value,			
wherein the second behavioral treatment value directs devices within the			
network to treat the second group of one or more packets with a second			
quality φf service treatment.			

